THE IMPACT OF DEREGULATION ON ENERGY CONSERVATION AND DSM MEASURES

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ABSTRACT

The regulated utility monopoly, with its defined and quasi–permanent rate schedules has, in many places, become a thing of the past. Therefore, determining the benefits of various facility operating options is no longer a straightforward calculation. In the new market, the economics of energy conservation and demand side management options will depend on price signals from the market. Unfortunately, the market is always changing and therefore affecting an end user's cost/benefit analysis. This problem is compounded by the fact that most, if not all, competitive energy service providers do not quote supply costs based on demand and energy costs. Rather, their quotes are for a fixed energy cost only, thereby eliminating any clear price signal to the end user to lower their demand.

Given these problems, the following questions must be answered for energy service companies to compete in the new market:

- What changes will energy service companies that are not affiliated with a facility's energy service provider, have to make to operate in this new world?
- Will long term contracts be necessary to lock in the benefits of different options?
- Can you still get pricing that is based on demand and energy rates?
- What sort of pricing and price signals have users in the Texas market received thus far?
- What known market indicators can energy service companies (ESCOs) watch to know when it is a good time to propose different options to customers?
- What regulatory changes could affect economics in the future?

The goal of this paper will be to answer these questions based on input from market suppliers and actual pricing examples received by Texas end users for the 2002 open market. Also, strategies for dealing with energy service providers and obtaining the needed price signals will be discussed.

Given that the new market structure will have to be dealt with from this point forward, now is the time to learn how to work with it, and maximize related business opportunities.

THE IMPACT OF DEREGULATION ON ENERGY CONSERVATION AND DSM MEASURES

In the past, determining the benefits of different electricity consumers' operating strategies or schedules was done by modeling the different scenarios on one or more of the electric utility's various rates. The rates were defined such that the avoided demand and energy costs were relatively easy to calculate. This made the economics of various energy options easily quantifiable and a relatively sure thing. Rate cases were the only thing that would cause the economics to change and those were typically rare, with the economics usually not drastically affected. Thus in the old world, the customer, and possibly the financier, didn't worry about the payback of a given project changing drastically overnight.

However, these relatively constant economic pictures did not come without a price. Because there were typically so few meaningful rate choices available, many operational strategies did not make sense. For instance, the economics of cogeneration, peak-shaving, thermal storage, and, in some instances (such as when three tiered rate schedules were used), even energy conservation options did not make sense if the rates didn't communicate the value of the option correctly.

One example would be the 10- to 14-hour on-peak demand period that some companies had in their rates. If thermal storage was to be considered, the system would have to be sized for this period to allow one or more chillers to be fully taken offline. What if a company already had a tank, like a fire protection tank, in place that would work for a shorter time period? Instead of getting a partial reward for turning some chillers off for the shorter time, the customer would not receive a benefit. This contradicts the value that is realized by being off for even a four or five hour time period during the peak of the summer.

In fact, the idea that loads need to be off for such a long time period to provide real value is, itself, suspect. As can be seen in the following table, the difference in the peak loading for the ERCOT grid are significantly different when you eliminate load data for even a four hour period, from 3:00 p.m. until 7:00 p.m., for the four summer months (see Fig. 1).

Figure 1.

Total Curtailment Time	10 Hours	8 Hours	6 Hours	5 Hours	4 Hours
Peak Load Reduction (MW)	6,218	5,174	3,562	2,829	1,197
Percent Load Reduction (vs. Actual Peak)	11.3%	9.4%	6.5%	5.1%	2.2%
Beginning Time	11 am - HE 12	12 pm - HE 13	1 pm - HE 14	2 pm - HE 15	3 pm - HE 16
Ending Time	9 pm - HE 21	8 pm - HE 20	7 pm - HE 19	7 pm - HE 19	7 pm - HE 19

HE – Hour Ending

So, if a customer offers to shave their peak four hours per day the supplier would be able to find value in it as a peaking asset that could be resold during the highest demand hours of the year, partially offsetting the need for 1197 MW in generation.

ENTER THE OPEN MARKET

However, the new, deregulated world is not so tame. With respect to both the surety of the financial benefits and the number of options available to the customer, there is definitely a new paradigm in town. There are many factors that can play into the overall economic picture of a given project. Besides the most widely publicized bankruptcy of a large energy company, many other factors can come into play:

- The amount, or perceived amount, of excess generation in the market
- The amount of generation under construction in the market
  If, in either of these cases, the market thinks it is, or will be, flush with capacity, your DSM project will not garner the rate differentials you might have hoped.
- The current cost of fuel
- The future value of fuel, relative to the cost of fuel when you locked in a price.
  If the fuel prices are high when you lock in your price or if they go up later, energy conservation options will be rewarded more. If during the term of the project prices go up, you can implement the option and sell the excess back to the supplier. However, if prices drop you will possibly not reap the full avoided cost in your energy supply contract.
- The transmission and distribution service provider (TDSP) charges (total cost)
- Whether or not the TDSP charges are demand or energy based
  Is the wire cost energy only or does it include demand? Is the demand based on Non-Coincident Peak (NCP) or Coincident Peak (CP)? These factors will effect both conservation and DSM projects.
- Whether or not the customer's load is settled based on Interval Demand Recorder (IDR) data or a standard profile
  If they are IDR in Electric Reliability Council of Texas (ERCOT), peak shaving can reap bigger rewards on both the supply and TDSP charges.
- For profiled loads, what their current and projected load factors will be
  If you are in the sub-40% load factor (LF) category and the demand improvement will push them into the 40% to 60% category, great. However, if you are going to move them from 42% LF to 59% LF, there will be no benefit on a profile.
- Regulatory changes (one of the biggest wild cards in California)
- Poorly designed market structures (California)

Given the drastically different landscape that energy service companies and energy professionals, such as those in academia, find themselves in, it is incumbent that they be prepared to address these new issues clearly and thoroughly for their clients. We now examine several scenarios that an energy professional could find.

Scenario 1: New Project, New Deal

When it comes to determining cost savings, the easiest, if not the best, situation a consultant or energy service company could find themselves in would be to complete an energy study just prior to seeking a new energy supply contract. If the consultant has found a variety of conservation and DSM project options the big question will be, what is the value of one or more of these projects?

In this situation the benefits can be determined by presenting both the base load shape and the different load scenarios from the conservation options to the possible suppliers. Given this information the suppliers will be able to directly communicate to the consultant and the client the benefit of the different options. The supplier will take the historical load data and determine their price for serving the current load, creating a base for

comparison. Then, when supplied data by the customer or consultant, they can also look at what the costs would be under one or more projected load scenarios reflecting the impact of recommended DSM or energy conservation options or both.

Why will it work this way? Why wouldn't you be able to use the demand cost from the supplier to determine the DSM savings and the energy cost to determine the conservation savings? Because most marketers in Texas and other states do not offer demand/energy pricing or, if they do offer it, only do so when specifically asked. Also, if the energy conservation will effect the client's consumption enough to move them close to the upper and lower usage bands typically put in place by a supplier's contract, then you would want the supplier to know about the planned effect up front.

Though the cost benefits are easily quantified in this situation there are other variables that come into play, namely contract length, payback period and predicted future market conditions. Given that the payback period for a project may be several years, it would require the customer to lock in the immediate price differential for that whole time period now to firmly justify the economics of the option. Of course, this may not be the best option for the customer.

Scenario 2: New Project, Energy Supply Already Contracted

Scenario 2 has two sub-scenarios, both of which depend on what the market has done since you contracted for power.

- Have Fuel Prices changed? If yes, have they increased or decreased?
- Has the capacity market (looked at as either a demand charge ($/KW) or the cost a generator is charging you to process either his or your fuel into electrons ($/kwh)) changed?

The effect of the change in price will also be dependent on the allowed usage bands in the customer's contract. If the proposed options are going to affect the usage in such a way that you will move it outside the usage bands of their contract, you will generally want to work with the supplier to maximize the benefits.

In the Texas market I saw a variety of approaches taken by various suppliers with respect to usage bands. I have seen offers that had to be within +/-5%, 10%, 20% of year ago usage levels for each "settlement period." The real differentiator turned out to be what is the "settlement period." ERCOT settles energy every 15 minutes and I had one supplier that offered one of my clients +/-5% for every 15 minute period (no, they did not win the bid). However, the same supplier later offered another client a choice of +/-20% each month or +/-10% per year. Other suppliers offered monthly, quarterly and annual settlements also, typically at +/- 10%. Some suppliers also settle on-peak and off-peak hours separately for a given month.

If you move a customer's usage outside the bands allowed by the contract, the supplier will have the ability to charge you based on formulas defined in the contract. For instance, if a customer doesn't use enough power and the marketer has to resell the energy they had reserved for them, the marketer will charge them for that energy if they cannot resell it at the price they were going to charge for it. Typically the customer would be charged the difference between their contract price for the power and the price the supplier can get for it on the spot market. In formula form:

Charge to customer = kwh usage outside band x (Market Price - Contract Price)

Understand that this formula was usually only applicable if the "Charge" was a positive number. If the marketer gets more for the power on the market (higher profits) they typically will not be sharing this with the client, unless this is agreed to ahead of time. In several contracts I saw the formula was made even more onerous by using only 95% of the then current market price in the above calculation.

If a customer exceeds the upper usage level the situation was treated in a similar manner. The typical formula for that scenario is:

Charge to customer = kwh usage outside band x (Contract Price - Market Price)

This being said, how does it affect your conservation project?

Scenario 2A — The Price of Power Goes Up

For instance, if power is worth more today than when the contract was written, then your supplier would be glad to resell the power and pocket all the profits. If your client wants to share in these added savings you will have to work with the supplier, independent of whether or not provisions allowing you to share in the savings were included in the original contract. This will be accomplished simply

through negotiating with the power supplier and helping them realize that they will benefit as well as the customer. The ability to share in the savings will also affect the economics of the options, thus determining whether or not the project will go forward.

Therefore, the formula to calculate the savings for an energy conservation project where the current market price (CMP) had increased since the original contract was signed would be:

(Equation 1)

Cost Savings = EUS x [[CMP – OCP] x Customers % of Margin + OCP]

EUS – Energy Usage Savings (kwh)
OCP – Original Contract Price ($/kwh)

Of course the customer's % of the margin will the result of negotiations with the suppliers.

One of the factors affecting these negotiations is the size of the energy reduction. If you are only going to save 100,000 kwh per year, they may not want to work with you on this. Splitting the savings on such a reduction may not overcome the supplier's transaction costs.

Another factor will be the CMP/OCP differential. If power prices have gone up $0.01/kwh then yes, you need to negotiate this. If pricing has gone up only $0.001/kwh then you better have a bigger project to justify the added effort on both of your parts.

Scenario 2B — The Market Price Has Decreased

This is the situation you do not want to find yourself in if you are going to change the customer's usage enough to move them outside the usage bands. If the usage stays within the bands then the benefit of any energy savings will be the contract price for energy. If, however, you move the usage outside the bands, the customer will receive less than the contract amount due to the supplier's taking a loss on the power they purchased for the customer when it is sold back into the market. In formula form this would look like:

(Equation 2)

Cost Savings = EUS x [OCP - [OCP - CMP]]

EUS – Energy Usage Savings (kwh)
OCP – Original Contract Price ($/kwh)
CMP – Current Market Price ($/kwh)

Scenario 3 — DSM

One other facet to consider is what happens when a DSM project is considered in the middle of a contract? DSM options will allow the supplier to lower their costs in most cases and these savings need to be passed on to the customer to provide economic justification for the DSM implementation.

As mentioned earlier, in the case of profiled loads, improving a customer load factor through DSM will not necessarily lower the supplier's costs. This is due to, in my opinion, a flaw in the Texas market design.

In Texas, meters less than 1,000 KW in size typically do not have interval demand recorders and are therefore not settled based on actual usage; they are settled based on profiles. Settlement is when, after the fact, ERCOT looks as how much load was being scheduled by a REP and how much load the REP was supposed to be serving and compares the two amounts for every 15 minutes of every day. Obviously, if the only data a meter provides is peak demand and energy usage once per month, you have to figure out a way to estimate the usage every 15 minutes. ERCOT's methodology for doing this is called profiling.

Different profiles exist for customers depending mainly on the customer's load factor. Three different profiles exist based on load factor criteria for the vast majority of sub-1,000 KW electric loads. ERCOT will take the appropriate profile curve and effectively raise and lower that curve until the amount of energy used during the month will fit under the curve.

The flaw in this process is this: When that curve is raised or lowered, the actual peak demand of the customer in no way affects the height to which the curve can go in the peak periods of the day. Therefore, if you don't increase a client's load factor enough to move them into the next settlement bracket, then they and the supplier will see no real benefit from the DSM measure. I truly believe this is something that needs to be fixed in the market. The quick fix of course is to put an IDR meter into place; however this will currently cost ~$750 to $1,000, thus increasing the implementation costs for the DSM option.

Profiling issues aside, getting clear price signals from a supplier in the middle of a contract will be dependent on many of the same criteria discussed earlier for conservation projects. Though there will be demand savings clearly communicated from the T&D rates, most suppliers are not currently prepared

to directly value KW reductions in load, other than by looking at the old and new energy usage patterns for the contract term and comparing the costs to serve each pattern.

Thus, as you can see, in the new deregulated market it will not be business as usual for energy professional of all types. The changes in the way electricity is bought and sold will not only affect end-use customer's lives, it will also affect how the energy service industry does business. As time goes by and markets mature, communicating the needed price signals for various conservation and DSM projects will become more effective. However, in the interim and for the future, I encourage all energy professionals to engage a specialist in procurement in their projects, whether in-house or outsourced, to help maximize the benefits for the customers.